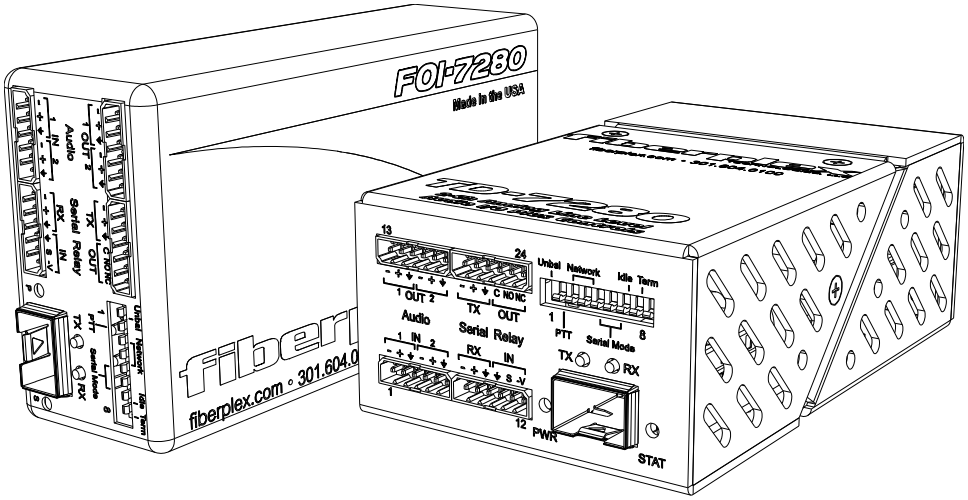


fiberplex TECHNOLOGIES, LLC

USER MANUAL

Line Level Stereo Audio Transceiver
with Serial Data and Controls
FOI-7280 / TD-7280

Warning for Your Protection

1. Read these instructions.

2. Keep these instructions.

3. Heed all warnings.

4. Follow all instructions.

5. Do not use this apparatus near water.

6. Clean only with a dry cloth.

7. Do not block any of the ventilation openings. Install in accordance with the manufacturer's instructions.

8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

11. Only use attachments/accessories specified by the manufacturer.

12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13. Unplug this apparatus during lightning storms or when unused for long periods of time.

14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

The apparatus shall not be exposed to dripping or splashing. No objects filled with liquids, such as vases, shall be placed on the apparatus.

"WARNING: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture."

General Installation Instructions

Please consider these general instructions in addition to any product-specific instructions in the "Installation" chapter of this manual.

Unpacking

Check the equipment for any transport damage. If the unit is mechanically damaged, if liquids have been spilled or if objects have fallen into the unit, it must not be connected to the AC power outlet, or it must be immediately disconnected by unplugging the power cable. Repair must only be performed by trained personnel in accordance with the applicable regulations.

Installation Site

Install the unit in a place where the following conditions are met:

- The temperature and the relative humidity of the operating environment must be within the specified limits during operation of the unit. Values specified are applicable to the air inlets of the unit.
- Condensation may not be present during operation. If the unit is installed in a location subject to large variations of ambient temperature (e.g. in an OB-van), appropriate precautions must be taken.
- Unobstructed air flow is essential for proper operation. Ventilation openings of the unit are a functional part of the design and must not be obstructed in any way during operation (e.g. - by objects placed upon them, placement of the unit on a soft surface, or improper installation of the unit within a rack or piece of furniture).
- The unit must not be unduly exposed to external heat sources (direct sunlight, spot lights).

Ambient Temperature

Units and systems by FiberPlex are generally designed for an ambient temperature range (i.e. temperature of the incoming air) of +5...+40 °C. When rack mounting the units, the following facts must be considered:

- The permissible ambient temperature range for operation of the semiconductor components is 0 °C to +70 °C (commercial temperature range for operation).
- The air flow through the installation must allow exhaust air to remain cooler than 70 °C at all times.
- Average temperature increase of the cooling air shall be about 20 C°, allowing for an additional maximum 10 C° increase at the hottest components.

If the cooling function of the installation must be monitored (e.g. for fan failure or illumination with spot lamps), the exhaust air temperature must be measured directly above the modules at several places within the enclosure.

Grounding and Power Supply

Grounding of units with mains supply (class I equipment) is performed via the protective earth (PE) conductor integrated in three pin Phoenix™ connector. Units with battery operation (< 60 V, class III equipment) must be earthed separately. Grounding the unit is one of the measures for protection against electrical shock hazard (dangerous body currents). Hazardous voltage may not only be caused by defective power supply insulation, but may also be introduced by the connected audio or control cables.

This equipment may require the use of a different line cord, attachment plug, or both, depending on the available power source at installation. If the attachment plug needs to be changed, refer servicing to qualified personnel.

Warranty, Service and Terms and Conditions of Sale

For information about Warranty or Service information, please see our published 'Terms and Conditions of Sale'. This document is available on fiberplex.com or can be obtained by requesting it from clients@fiberplex.com or calling 301.604.0100.

Disposal

Disposal of Packing Materials

The packing materials have been selected with environmental and disposal issues in mind. All packing material can be recycled. Recycling packing saves raw materials and reduces the volume of waste. If you need to dispose of the transport packing materials, recycling is encouraged.

Disposal of Used Equipment

Used equipment contains valuable raw materials as well as substances that must be disposed of professionally. Please dispose of used equipment via an authorized specialist dealer or via the public waste disposal system, ensuring any material that can be recycled has been. Please take care that your used equipment cannot be abused. After having disconnected your used equipment from the mains supply, make sure that the mains connector and the mains cable are made useless.

Disclaimer

The information in this document has been carefully checked and is believed to be accurate at the time of publication. However, no liability is assumed by FiberPlex for inaccuracies, errors, or omissions, nor for loss or damage resulting either directly or indirectly from use of the information contained herein.

Introduction

Elegantly simple yet packed with an advanced feature set, the FiberPlex Technologies, FOI(TD)-7280 is a powerful problem solver when it comes to routing audio. The unit converts line level, stereo analog audio to fiber for long or short haul transport. In addition to the audio, a multi-format serial data connection and a bidirectional pair of contact closures are included.

Key Features

- Audio Interface:
  - Supports Balanced and Unbalanced Audio I/O
  - High Quality 24-bit audio
  - Ultra Wide 20 Hz to 45 kHz Frequency Response
  - Supports Ultrasonic Signaling
- Serial Interface:
  - RS-232, RS-422, RS-485 (2/4 wire)
  - Data Rates from 0 to 1 Mbps
- Contact Closures:
  - 'Form C' Contacts
  - Supports Push to Talk
- Advanced Routing:
  - Point to Point
  - Broadcast Mode
  - Intercom/Loop
  - Multichannel Add/Drop
- Power:
  - TD includes power adapter as well as a 3-position Phoenix™ connector

Differences between FOI-7280 and TD-7280

Functionally, the FOI-7280 and TD-7280 are identical. The only differences are the packaging and power supply. The FOI-7280 is part of the FOI line of products designed for ruggedized mil applications. It is housed in the familiar FOI shielded can enclosure. For standalone applications it can be powered by adding a PSQ-4909 AC supply or a PSQ-4920 DC power supply (not included). Optionally, up to 8 FOI units can be mounted on CMA chassis adapters and installed in an RMC-3101 or RMC-2101 rack mount chassis. The units are powered redundantly by a common back plane connection.

The TD-7280 is housed in the commercial 'Throw Down' packaging. This version is designed to be a work horse unit in various commercial and industrial environments. It is powered either by a 9VDC 'Wall Wart' style supply (included) or via bussed power supplied through an integrated three pin Phoenix™ connector. Up to six TD-7280 units can be installed in the optional 1U TDR-01 rack shelf.

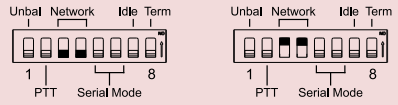
Getting Started

Initial Inspection

Immediately upon receipt, inspect the shipping container for damage. The container should be retained until the shipment has been checked for completeness and the equipment has been checked mechanically and electrically. If the shipment is incomplete, if there is mechanical damage, or if the unit fails to operate notify FiberPlex and make the shipping materials available for the carrier's inspection.

Set Up (Basic Point to Point)

1) **IMPORTANT** Set the 'Network' setting on the Configuration Switch according to diagram on right, see 'Connection Details' for more information
2) Connect all external wiring to the Interface Connector, see 'Interface Details' for more information
3) Connect fiber between units linking the TX from the first unit to the RX of the second
4) Connect power



First Unit Second Unit

Switch settings shown for standard Point to Point Setup. First Unit is Point to Point Master and Second Unit is set to Slave.
The FOI(TD)-7280 **WILL NOT WORK** reliably with both modules configured as Slave.

Front Indicators/Connections

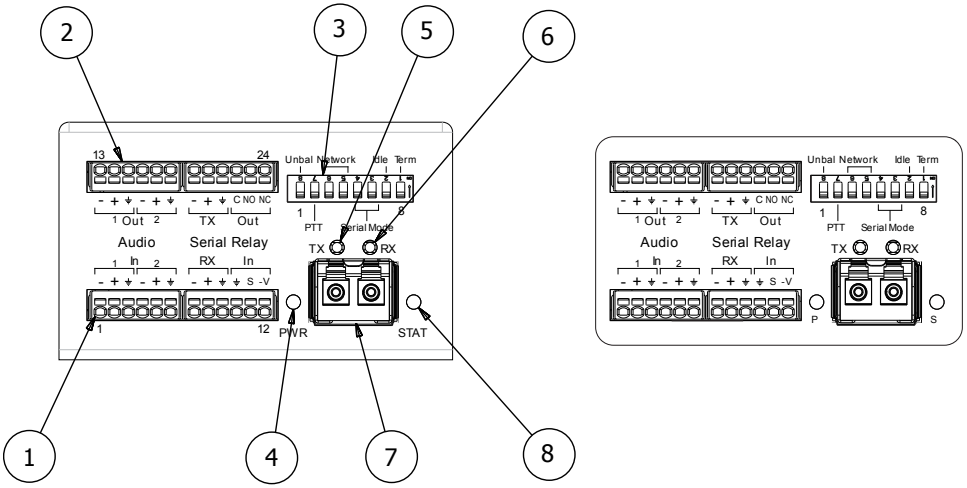


Figure 1 TD-7280 (left) and FOI-7280 (right) Front Face

(1) **Input Pins 1-12 &** (2) **Output Pins 13-24** – These headers contain all of the I/O for the 7280 interface. Connections can be made using the included Phoenix™ Spring-cage plug (P/N 1778874). Wire ranging from 26-20 AWG can be inserted directly into the spring-cage without tools (see "Using Phoenix Connectors" later in the manual for more information). Audio connections are grouped on pins 1-6 (inputs) and 13-18 (outputs), Serial Data connections are found on pins 7-9 (RX) and 19-21 (TX) Control activation is on 10-12 and Relay contact closures are on 22-23. See "Connection Details" later in the manual for specifics related to each type of I/O port. Below is a detailed pinout for these connections:

CONNECTOR PINOUTS			
Pin	**Description**	**Pin**	**Description**
1	Audio in 1 minus	13	Audio out 1 minus
2	Audio in 1 plus (unbal)	14	Audio out 1 plus (unbal)
3	Audio in ground	15	Audio ground
4	Audio in 2 minus	16	Audio out 2 minus
5	Audio in 2 plus (unbal)	17	Audio out 2 plus (unbal)
6	Audio ground	18	Audio ground
7	Serial in minus	19	Serial out minus
8	Serial in plus	20	Serial out plus
9	Serial Ground	21	Serial Ground
10	Relay ground	22	Relay out common
11	Relay in, ground to activate	23	Relay out Normally Open (NO) contact
12	Relay in, minus 6-48V to activate	24	Relay out Normally Closed (NC) contact

(3) **Configuration Switch** – Audio, Network and Serial Data configuration is set via 8 Dip switches. Setting for these switches can be found in the table below. See "Connection Details" section later in the manual for more specific description of all of the modes of operation.

SWITCH SETTINGS					
Marking	**Description**	**Pos**	**Switch**		**Setting**
Unbal	Convert audio inputs and outputs to unbalanced	1	↑		Unbalanced, single-ended
			↓		Balanced, differential
PTT	Mute audio inputs based on state of control input	2	↑		Auto-mute
			↓		Transmit Always
Network	Network mode selection	3-4	↑	↑	Slave
			↑	↓	Intercom Master
			↓	↑	Broadcast Master
			↓	↓	Point to point Master
Serial Mode	Serial protocol select	5-6	↑	↑	RS-485 2-wire
			↑	↓	RS-485 4-wire
			↓	↑	RS-422
			↓	↓	RS-232
Idle	Serial Idle State for RS-485	7	↑		Idle state = 1
			↓		Idle state = 0
Term	Serial line termination enable	8	↑		No Termination
			↓		Termination Enabled

(4) **Power** – LED which indicates the presence of DC power in the unit. Note that on start-up, the unit will perform a quick lamp check, flashing all LEDs

Power Indicator	
Off	No power from the external supply or internal fault
Blue	Power supply is operating properly

(5) **TX Fault** (6) **RX Detect** – There is one pair of these LED indicators associated with each SFP slot on the unit. They correspond to the slot directly below. Color indications can be interpreted using the following table:

TX Fault	RX Detect	SFP Installed	Transmitter Functioning	Receive Signal Present
Off	Off	No	n/a	n/a
Red	Red	Yes	No	No
Red	Green	Yes	No	Yes
Green	Red	Yes	Yes	No
Green	Green	Yes	Yes	Yes

(7) **SFP Port** – Install an optical SFP in this slot. This slot conforms to the SFP MSA pinouts (INF-8074i, more information later in this manual). Any standard MSA complaint optical SFP can be used in this slot that supports a minimum data rate of 346Mbps.

Units ordered with the "-L5B" and "-L12" option come with an appropriate SFP pre-installed. The "-C" option has an empty SFP cage that can accept either a user supplied SFP or a Quadrax SFP-SFP cable (ordered separately) for connection to the FiberPlex WDM16 or WDM8.

8 **Status** – LED which indicates the health status of the unit. The LED can be interpreted according to the following table.

Status Indicator	
Off	If Power LED is on, there is an internal failure inside the FOI. Replace
Green	Power supply is operating properly
Amber	At limit of normal range of temperature, apply more cooling to the unit
Red	Exceeding temperature limits or internal failure

Rear Indicators/Connections

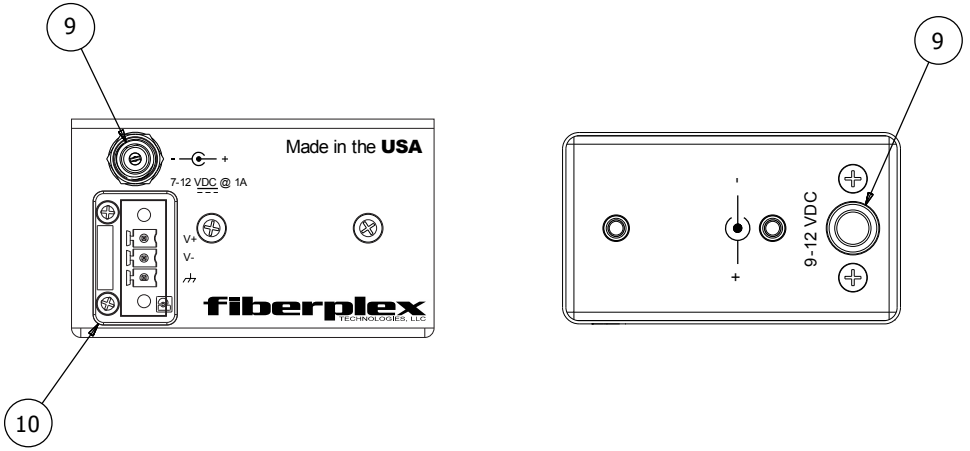


Figure 2 TD-7280 (left) and FOI-7280 (right) Rear Face

9 **Circular DC Power Connection** – DC power entry for the unit. On the FOI-7280 this is a LEMO™ connector designed to interface with either a PSQ power module or RMC chassis. On the TD-7280 this is a standard DC connection for use with the included DC wall power supply.

10 **Phoenix™ Power Connection** – Secondary power option for the TD-7280. This is wired in direct parallel with the Circular connector and has the addition of a positive earth chassis ground connection. This can be used to power the unit on a client supplied power buss.

Power Requirements and Mounting

Flexible mounting allows the FOI-7280 to be chassis mounted or standalone configuration. Any combination of 8 FiberPlex FOI units can be mounted in a RMC-3101 using CMA-2001 chassis mount adapters. The RMC-3101 can accommodate hot swapped redundant power. Alternately, the FOI-7280 can be used in a standalone application when paired with a PSQ-4909 for full range AC operation or the PSQ-4920 for 12-48VDC operation

Complementing the flexibility of the FiberPlex 'TD Series' of fiber optic modules, the TDR-01-AC provides mounting, power and cable management for up to 6 modules in a compact and rugged aluminum 1U rack. The integrated key-hole mounting holes on the bottom the TD units lock securely on mating studs while a rear retention bar holds them securely in place. A 6 position wiring harness and included power adapter provide, not just 9 VDC power, but a positive earth ground to the modules via 3 position Phoenix™ locking power connectors. Managing all that cabling and fiber can sometimes be quite a chore so an extended cabling tray with integrated tie down points are provided to help make your installation clean.

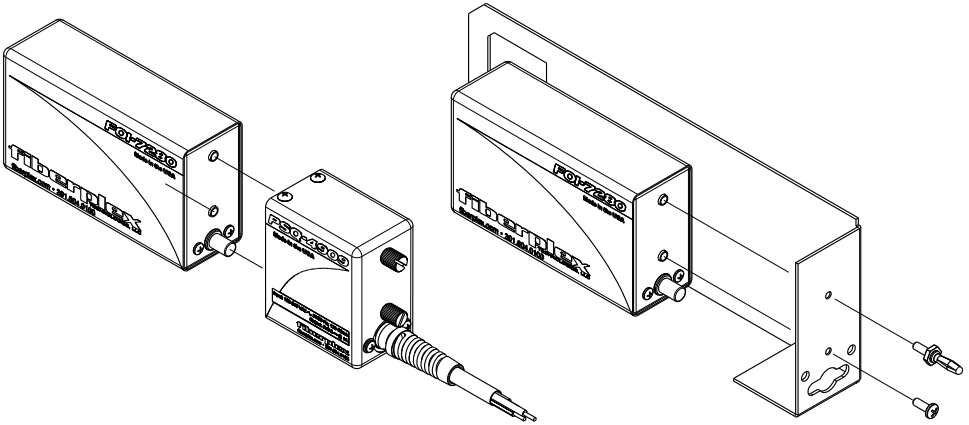


Figure 3 FOI-7280 with PSQ-4909 (left) and FOI-7280 with CMA-3002 (right)

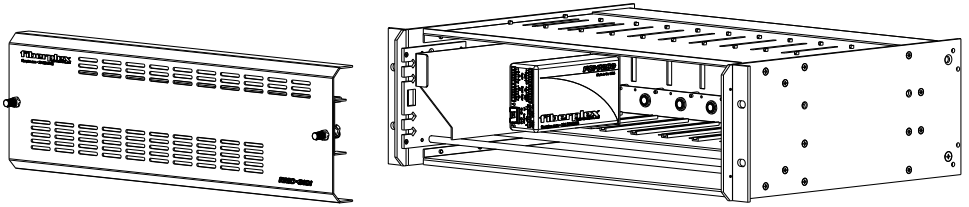


Figure 4 FOI-7280 Installed in an RMC-3101 Chassis

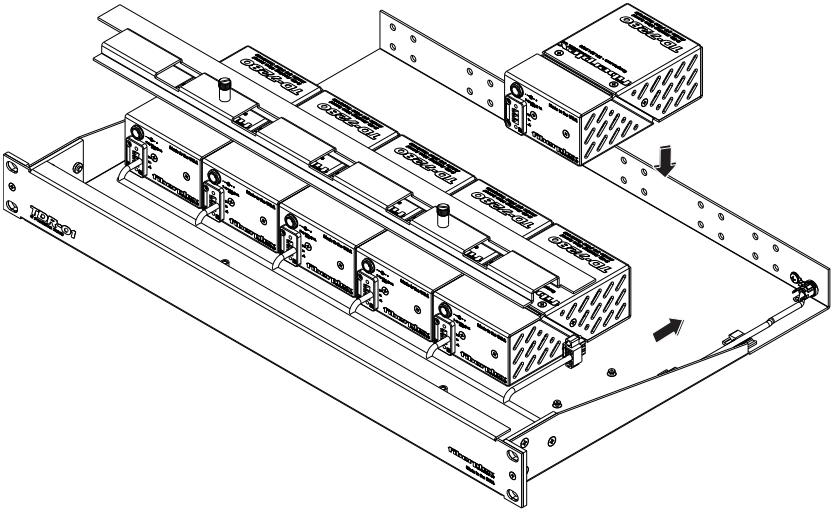


Figure 5 TD-7280 installation on a TDR-01-AC tray

Inserting and Removing SFP Modules

Handling Warnings

SFP Modules are static sensitive. To prevent damage from electrostatic discharge (ESD), it is recommended to attach an ESD preventative wrist strap to your wrist and to a bare metal surface when you install or remove an SFP Module.

Disconnect all optical or copper cables from SFP Modules prior to installing or removing the SFP Module. Failure to do so could result in damage to the cable, cable connector or the SFP Module itself. Removing and inserting an SFP Module can shorten its useful life, so you should not remove and insert SFP Modules any more often than is absolutely necessary.

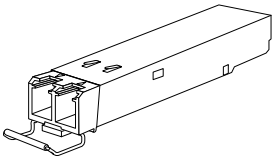
Protect optical SFP modules by inserting clean dust covers into them after the cables are removed. Be sure to clean the optic surfaces of the fiber cables before you plug them back into the optical ports of another SFP module. Avoid getting dust and other contaminants into the optical ports of your SFP modules, because the optics will not work correctly when obstructed with dust.

Identify the Latch Type of the SFP Module

SFP Modules have various latching mechanisms to secure them into the SFP Cage of a device. FiberPlex Modules can support a host of manufacturers and brands of SFP Modules so the user may encounter any number of different latches. Some of these are described below.

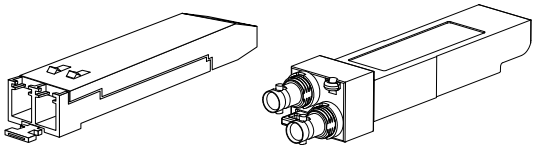
Bail Clasp

The bail clasp SFP module has a clasp that you use to remove or install the SFP module.



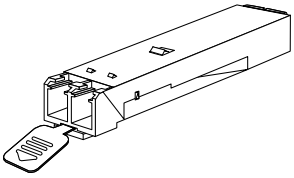
Actuator Button

The actuator button SFP module includes a button that you push in order to remove the SFP module from a port. This button can either lift 'Up' or press 'In' to release the SFP Module depending on the manufacturer.



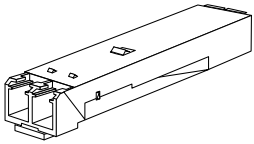
Mylar Tab

The Mylar tab SFP module has a tab that you pull to remove the module from a port.



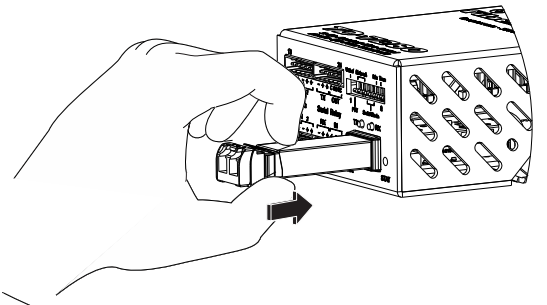
Slide Tab

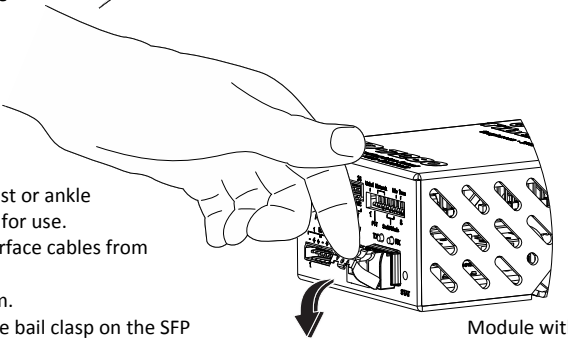
The slide tab SFP module has a tab underneath the front of the SFP module that you use to disengage the module from a port.



Inserting a Module

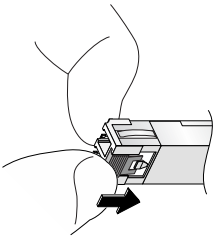
1) Attach an ESD-preventative wrist or ankle strap, following its instructions for use.
2) Disconnect and remove all interface cables from SFP Module.
3) If the SFP Module has a Bail Clasp , close the Bail Clasp before inserting the SFP Module.
4) With the gold finger connector on the bottom and the label on the top, line up the SFP Module with the empty cage and slide it in making sure that it is completely inserted and seated in the cage.



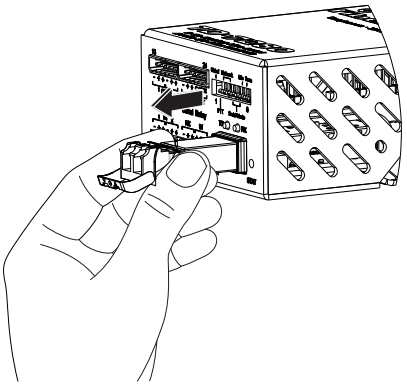


Removing a Module

1) Attach an ESD-preventative wrist or ankle strap, following its instructions for use.
2) Disconnect and remove all interface cables from SFP Module.
3) Release the latching mechanism.
    - Bail Clasp – Open the bail clasp on the SFP Module with your finger in a downward direction.
    - Actuator Button – Gently press the actuator up (or in) while pulling the body of the SFP Module to release the SFP Module from the cage.
    - Mylar Tab – Pull the tab gently in a straight outward motion until it disengages from the port. Make sure the tab is not twisted when pulling as it may become disconnected from the SFP Module.
    - Slide Tab - With your thumb, push the slide tab on the bottom front of the SFP module in the direction of the equipment to disengage the module from the line card port. If you pull on the SFP module without disengaging the tab, you can damage the SFP module.



4) Grasp the SFP Module between your thumb and index finger and carefully remove it from the port
5) Place the SFP Module on an antistatic mat, or immediately place it in a static shielding bag or container



Interface Details

Audio Connections

The audio path in the FOI(TD)-7280 provides a high quality bi-directional stereo audio pathway. Line level analog inputs are sampled at 96KHz with 24 bit resolution. The inputs have a wide frequency response (20Hz - 45KHz) for maximum audio fidelity; however this wide range also accommodates ultra-sonic signaling found in some electronic devices including some Intercom systems. Interface Connector Pin 1-6 compromise the balanced audio inputs with channel 1 on Pins 1-3 and channel 2 on 4-6. For unbalanced, or single ended, operation, set the 'Ubal' switch on the Configuration Switch (position 1) to the enabled, or up position. This provides a +6dB boost to the signal to maintain unity gain. Unbalanced audio inputs can then be connected using the 'Plus' and 'Ground' connections (Pins 2&3 and 5&6).

The analog audio outputs are found on Interface Connector Pins 13-18 and are unity gain line level outputs meaning whatever signal level you present to the corresponding remote input you will receive on the output. Like the inputs, the audio outputs are balanced by default and can be turned in to unbalanced outputs by enabling the 'Unbal' switch in the Configuration switch. Unbalanced audio outputs can then be connected using the 'Plus' and 'Ground' connections (Pins 14&15 and 17&18).

BALUN

Two FOI(TD)-7280 units connected via fiber can be used as a BALUN (Balanced / Unbalanced converter) by leaving one unit set to 'Balanced' mode and the remote unit set to 'Unbalanced' mode.

Voltage Sensor for SCADA

The unique audio input and output design of the FOI(TD)-7280 can accommodate DC voltages as well as analog audio I/O. Certain sensors and transducers used in SCADA (Supervisory Control and Data Acquisition) such as temperature sensors, pressure gauges, etc. report their status by using a variable DC Voltage output. These devices can be connected directly to the audio path to transit this data via fiber to Remote Terminal Units (RTUs) that may be some distance away.

Push To Talk (PTT)

With the 'PTT' switch enabled on Configuration Switch (position 2), the audio inputs of the unit are muted until there is an activation of either the Shorting Activation (Interface Connector Pin 11) or the Negative Voltage Activation (Interface Connector Pin 12). The audio will continue to be transmitted as long as one or both of these pins remains active. When both pins are in the non-active state, the audio will once again be muted. There is more information in the PTT section of the Control Connections section later in the manual.

Serial Data Connections

The FOI(TD)-7280 provides a highly flexible serial data interface. The serial data is 'tunneled' through the fiber connection and presented to the I/O connector of the remote unit as if a null-modem cable was connected. The RX (data input) pins for serial interface can be found on Pins 7-9 of the Interface Connector and the TX (data output) pins can be found on Pins 19-21. Configuration Switch 'Serial Mode' settings (positions 5-6) are used to define the physical configuration of the serial interface. See 'Switch Settings' in the 'Getting Started' section earlier in the manual for details.

Serial Termination

As dictated by the application, default serial line termination of 150KΩ can be removed by enabling the 'Term' switch on the Configuration Switch (position 8). This applies to RS-422 and RS-485 modes only.

RS-232

With 'Serial Mode' setting on the Configuration Switch set to 'off, off', RS-232 mode is enabled. In this mode, physical connection are made on Interface Connector Pins 8&9 (RX) and 20&21 (TX). This is a standard RS-232 interface with a maximum data rate of 1 Mbps with a 3K ohm load. Detailed electrical specifications of the interface can be found in the specification table at the end of the manual.

RS-422

With 'Serial Mode' setting on the Configuration Switch set to 'off, on', RS-422 mode is enabled. In this mode, balanced physical connection are made on Interface Connector Pins 7&8 (RX) and 19&20 (TX) with serial ground reference on Pins 9&21. This is a standard RS-422 interface with a maximum data rate of 1 Mbps.

Detailed electrical specifications of the interface can be found in the specification table at the end of the manual.

RS-485 (4-wire)

With 'Serial Mode' setting on the Configuration Switch set to 'on, off', RS-485 (4-wire) mode is enabled. In this mode, balanced physical connection are made on Interface Connector Pins 7&8 (RX) and 19&20 (TX) with serial ground reference on Pins 9&21. This is a standard RS-485 interface with a maximum data rate of 1 Mbps. Depending on the configuration of the third party equipment connected, the definition of the Idle State of the line may need to be set. This is accomplished using the 'Idle' switch of the Configuration Switch (position 7). With this switch in the disabled state, the idle state of the line will be a '0', when enabled, idle line state is a '1'. Detailed electrical specifications of the interface can be found in the specification table at the end of the manual.

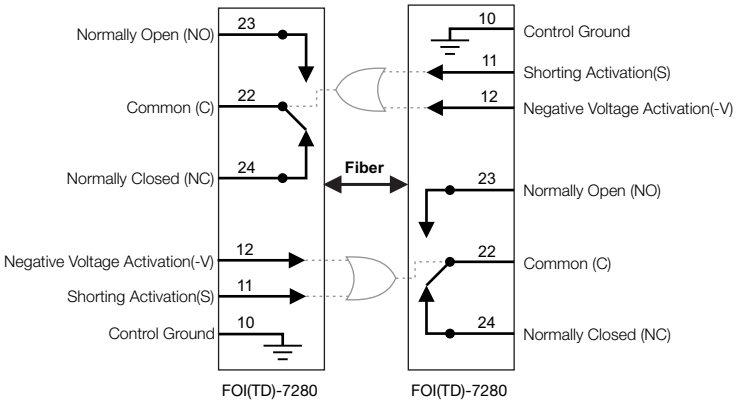
RS-485 (2-wire)

With 'Serial Mode' setting on the Configuration Switch set to 'on, on', RS-485 (2-wire) mode is enabled. In this mode, balanced physical connection are made on Interface Connector Pins 19&20 (RX/TX) only with serial ground reference on Pin 21. This is a standard RS-485 (2-wire) interface with a maximum data rate of 1 Mbps. Depending on the configuration of the third party equipment connected, the definition of the Idle State of the line may need to be set. This is accomplished using the 'Idle' switch of the Configuration Switch (position 7). With this switch in the disabled state, the idle state of the line will be a '0', when enabled, idle line state is a '1'. Detailed electrical specifications of the interface can be found in the specification table at the end of the manual.

Control Connections

Bi-directional control capabilities are available on interface connector pins 10-12 and 22-24. There are two types of control activation inputs and a single pole double throw relay output. Pin 11 is a shorting control input, when this pin is shorted to ground (Pin 10) the relay on the mating FOI(TD)-7280, on the remote side of the fiber link, is activated. Likewise, applying a negative DC voltage in the range of -6 to -48 VDC to Pin 12 will activate the remote relay. These inputs are ORed meaning that if either one or both are activated, the remote relay is activated.

The relay pins are found on Pins 22-24 with Pin 22 being the common connection, Pin 23 being a Normally Open (NO) connection with respect to the common pin, and Pin 24 being a Normally Closed (NC) connections with respect to the common pin. An activation on the remotely connected unit will cause these Normal states to reverse; Pin 23 shorts with Pin 22 and the Normal connection between Pin 24 and Pin 22 is broken. These states remain reversed as long as the activation pin on the remote unit is enabled. When the activation is release, they return to their Normal state.



PTT

The 'PTT' DIP switch 2 must be enabled for Push-To-Talk functionality. This setting mutes the audio inputs. To activate the PTT operation, apply a negative voltage to pin 12 or ground pin 11 by shorting pin 10 and 11 together on the interface connector. This will actuate the relay in the FOI(TD)-7280 at the far end causing pins 22 and 23 to close and pins 22 and 24 to open, and also enables the local transmission of the audio inputs.

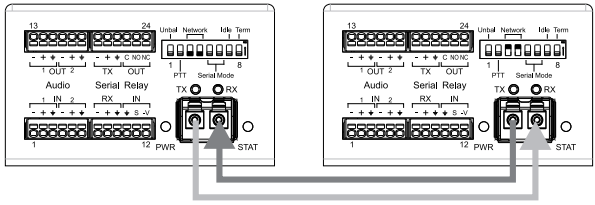
Connection Details

The ‘Network’ switches on the Configuration Switch (positions 3-4) set the both the network mode of the unit as well as determine the clock master in a multi-unit configuration. This allows the FOI(TD)-7280 to be a very useful tool in distributing audio and serial data, both point to point, and multipoint.

NOTE: The FOI(TD)-7280 **WILL NOT WORK** reliably with both(all) modules configured as Slave.

Point to Point Mode

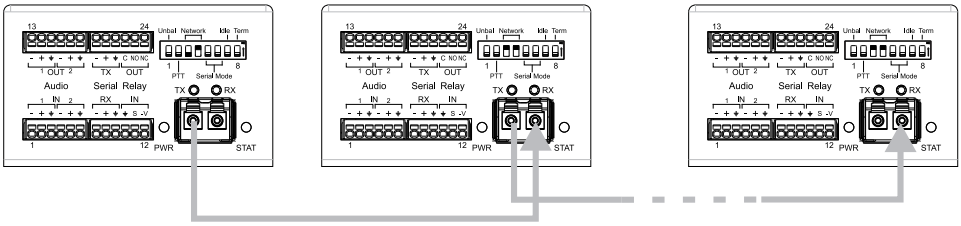
With ‘Network’ setting on the Configuration Switch set to ‘off, off’ on the first unit and ‘on, on’ on the second unit Point to Point mode is enabled. A single fiber pair is connected from the TX of the first unit to the RX of the second and from TX of the second unit to the RX of the first. This is the basic configuration.



‘Network’ Setting: Point to Point Master ‘Network’ Setting: Slave

Broadcast Mode

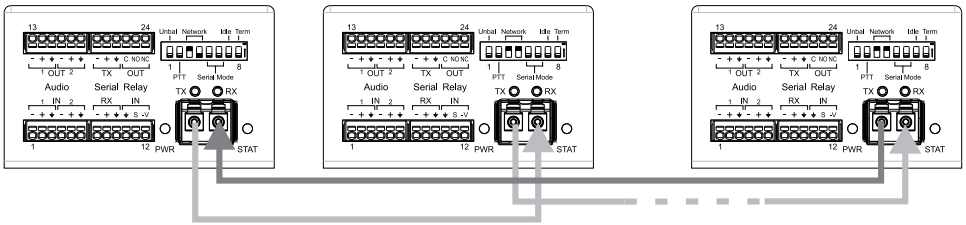
With ‘Network’ setting on the Configuration Switch set to ‘off, on’ on the first unit and ‘on, on’ on all other units, Broadcast mode is enabled. A single fiber is connected from the TX of the first unit to the RX of the second and from TX of the second unit to the RX of the next and so forth until all units are connected. The RX of the first unit and TX of the last will have no fiber connection.



‘Network’ Setting: Broadcast Master ‘Network’ Setting: Slave ‘Network’ Setting: Slave

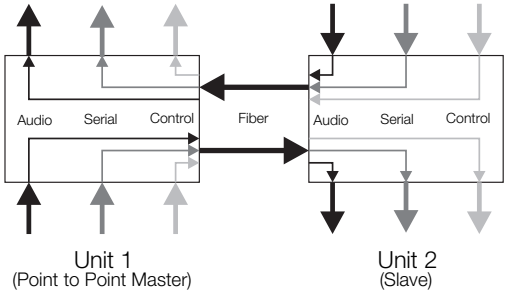
Intercom / Loop Mode

With ‘Network’ setting on the Configuration Switch set to ‘on, off’ on the first unit and ‘on, on’ on all other units, Intercom/Loop mode is enabled. A single fiber is connected from the TX of the first unit to the RX of the second and from TX of the second unit to the RX of the next and so forth until all units are connected. The TX of the last unit is then looped back to the RX of the first unit.

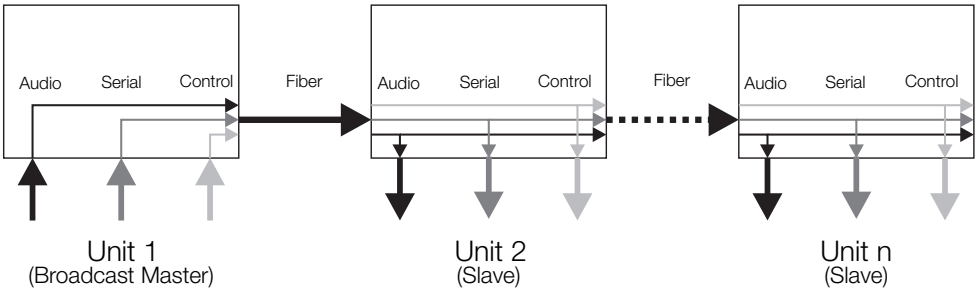


‘Network’ Setting: Intercom Master ‘Network’ Setting: Slave ‘Network’ Setting: Slave

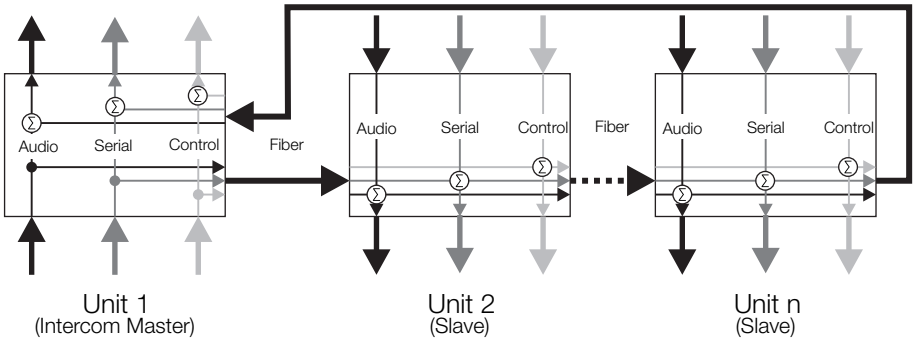
The first unit is configured as the master, which sets the clock and sample rate, the other, as the slave. Audio inputs one unit map directly to audio outputs on the other unit. Serial data and contact closures are a direct connection.



The first unit is configured as the master, which sets the clock and sampling rate. Audio, control and serial inputs on the master are sent to all the slaves, which output the data on their respective ports. No communication is sent from the slaves back to the master or to each other.

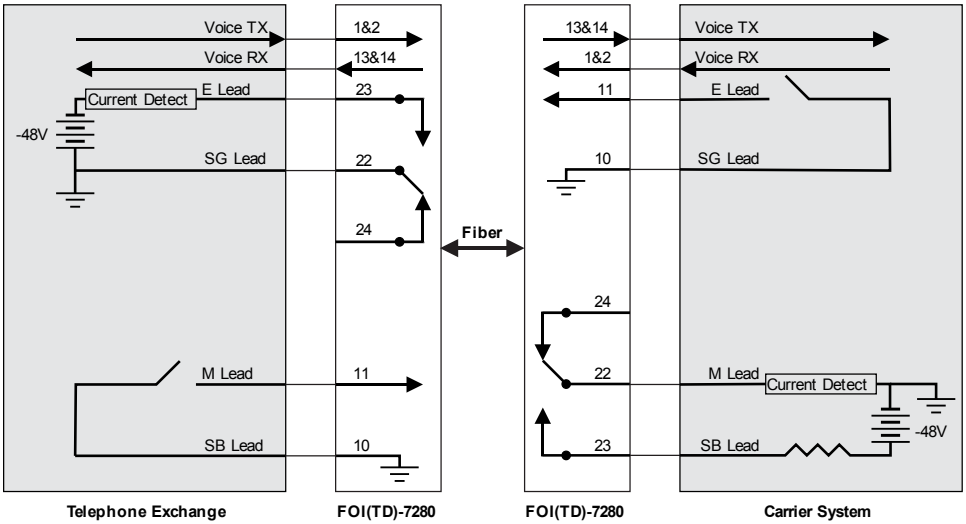


The master sends the audio from its inputs to the next unit with each successive unit in the loop adding its own input to the aggregated sample, gated by its push to talk, if enabled. When the aggregated sample returns back to the master, it then sends out that aggregated sample as the output for all units in the loop. All units forward the aggregated output around the loop until it returns to the master, which discards it. Serial data and control are also aggregated, such that any Control Activation Input on any unit causes all units to activate their Control Relays. Likewise, if any unit's serial input is non-idle, all units will then output a non-idle condition.

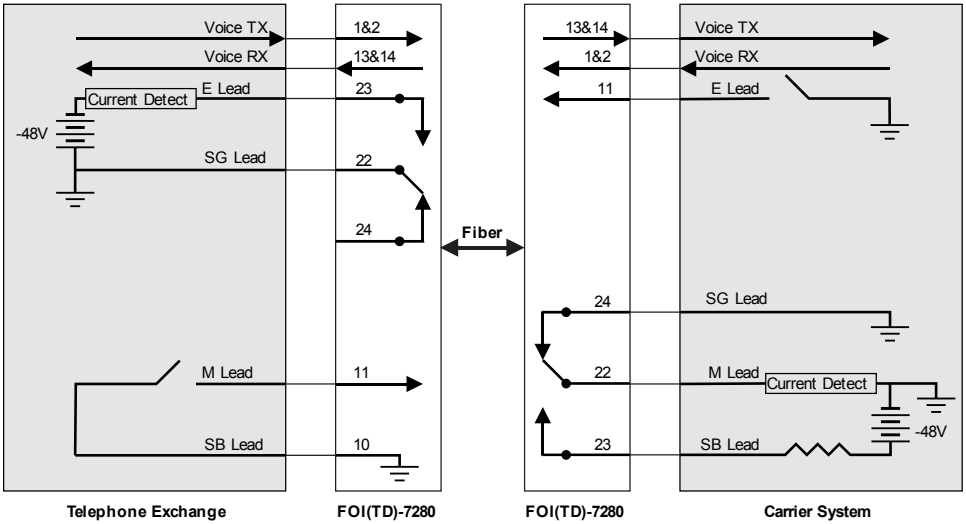


E&M Configurations

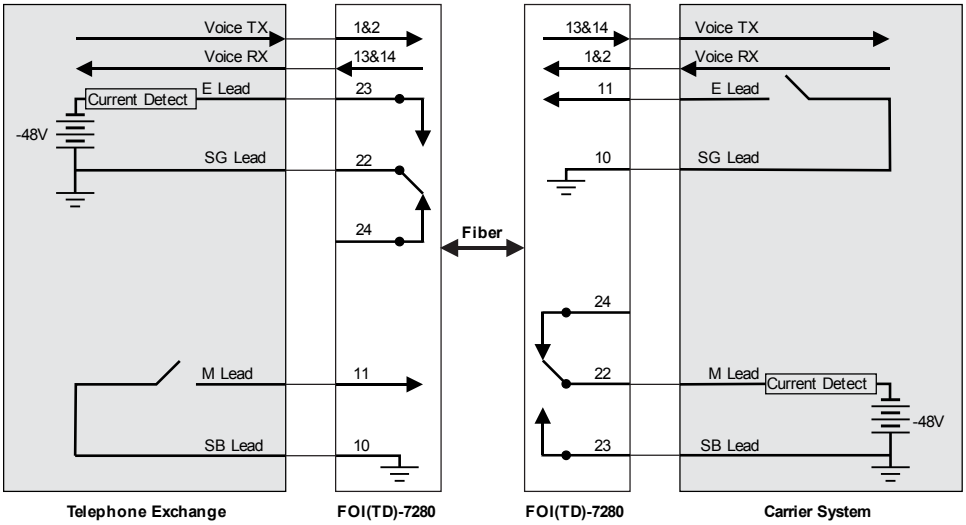
Type II - Two signaling nodes can be connected back-to-back. Type II uses four leads for supervision signaling: E, M, SB, and SG. During inactivity the E-lead and the M-lead are both open. The PBX indicates an off-hook condition by connecting the M-lead to the signal battery (SB) lead on the tie line equipment side. The router indicates an off-hook condition by connecting the E-lead to the signal ground (SG) lead on the trunk circuit side.



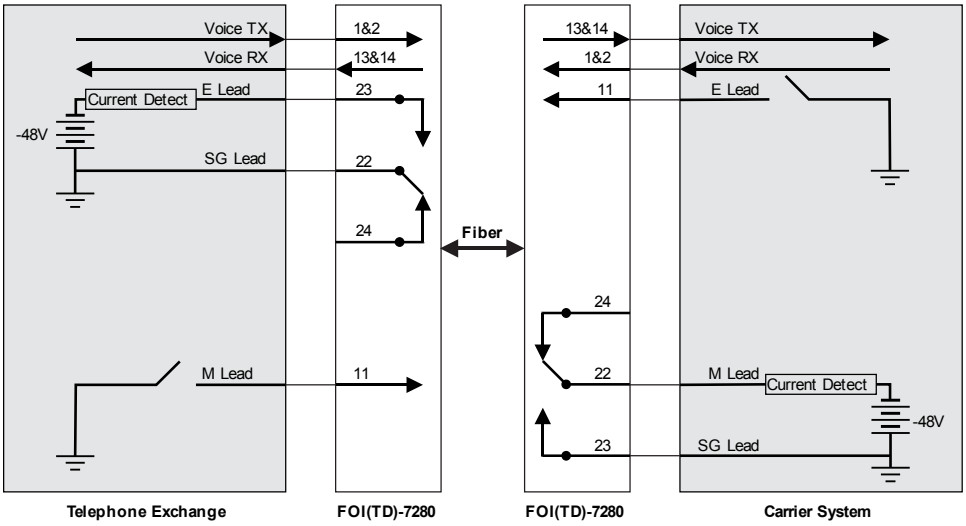
Type III - This is not commonly used in modern systems. Type III uses four leads for supervision signaling: E, M, SB, and SG. During inactivity the E-lead is open and the M-lead is connected to the signal ground (SG) lead on the tie line equipment side. The PBX indicates an off-hook condition by disconnecting the M-lead from the signal ground (SG) lead and connecting it to the signal battery (SB) lead on the tie line equipment side. The router indicates an off-hook condition by connecting the E-lead to ground on the trunk circuit side.



Type IV -Type IV uses four leads for supervision signaling: E, M, SB, and SG. During inactivity the E-lead and the M-lead are both open. The PBX indicates an off-hook condition by connecting the M-lead to the signal battery (SB) lead on the tie line equipment side. The router indicates an off-hook condition by connecting the E-lead to the signal ground (SG) lead on the trunk circuit side.



Type V -Type V is symmetrical and allows two signaling nodes to be connected back-to-back. This is the most common interface type used outside of North America. Type V uses two leads for supervision signaling: E and M. During inactivity the E-lead and the M-lead are both open. The PBX indicates an off-hook condition by connecting the M-lead to ground on the tie line equipment side. The router indicates an off-hook condition by connecting the E-lead to ground on the trunk circuit side.



SFP MSA Compliance

The SFP Multisource Agreement (MSA) is an agreement that was drafted among competing manufacturers of SFP optical modules. The SFF Committee was formed to oversee the creation and maintenance of these agreements including the SFP MSA designated as INF-8074i. This agreement describes a mutually agreed upon standard for the form and function of SFP modules. However, not all SFPs produced are MSA compliant. The MSA provides for a transceiver (TX/RX) pinout. Other industries such as broadcast had the need for dual TX and dual RX SFP for uni-directional applications such as video. Naturally, a non-MSA standard was introduced allocating pinout assignments for dual output and dual input I/O configurations. In addition, the some of the internal serial communication pins were reassigned.

The FOI/TD-7280 will only accept MSA compliant SFP modules which support a 346 Mbps data rate.

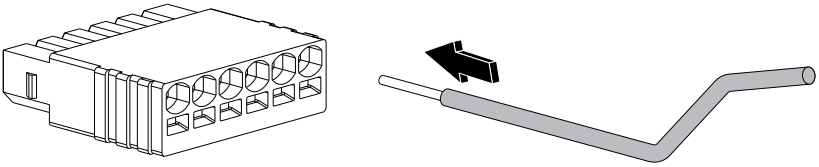
Pinout Comparison Chart

PIN	Transceiver (MSA)	Transceiver (Non-MSA)	Dual TX (Non-MSA)	Dual RX (Non-MSA)
1	VEE	VEE	VEE	VEE
2	TX_FAULT [VEE]	VEE	NC	Rx2-
3	TX_DIS	NC	NC	Rx2+
4	MOD_DEF(2) - SDA	VEE	VEE	VEE
5	MOD_DEF(1) - SCL	SCL	SCL	SCL
6	MOD_DEF(0) – PRESENCE [VEE]	SDA	SDA	SDA
7	Rate [NC]	VEE	VEE	VEE
8	LOS	RX1_LOS	Tx2+	NC
9	VEE	NC	Tx2-	NC
10	VEE	NC	Tx2_DIS	NC
11	VEE	VEE	VEE	VEE
12	RD-	Rx1-	NC	Rx1-
13	RD+	Rx1+	NC	Rx1+
14	VEE	VEE	VEE	VEE
15	VCC	VCC	VCC	VCC
16	VCC	VCC	VCC	VCC
17	VEE	VEE	VEE	VEE
18	TD+	Tx1+	Tx1+	NC
19	TD-	Tx1-	Tx1-	NC
20	VEE	Tx1_DIS	Tx1_DIS	NC

Using Phoenix Connectors

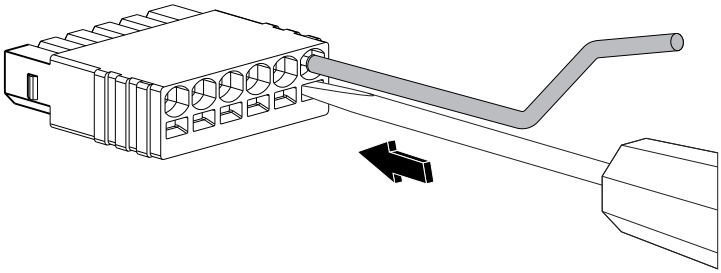
To make connections to the Phoenix connector:

- Strip wire approximately 0.5” (12.5 mm)
- If stranded wire is being used, twist strands together
- Insert into the desired channel by pressing the wire into the corresponding hole

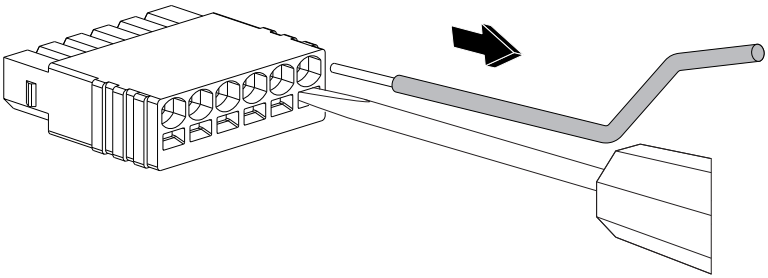


To remove a wire from the Phoenix connector:

- Insert the tip of a small blade screwdriver into the slot directly under the wire hole



- Pull wire to remove



Specifications

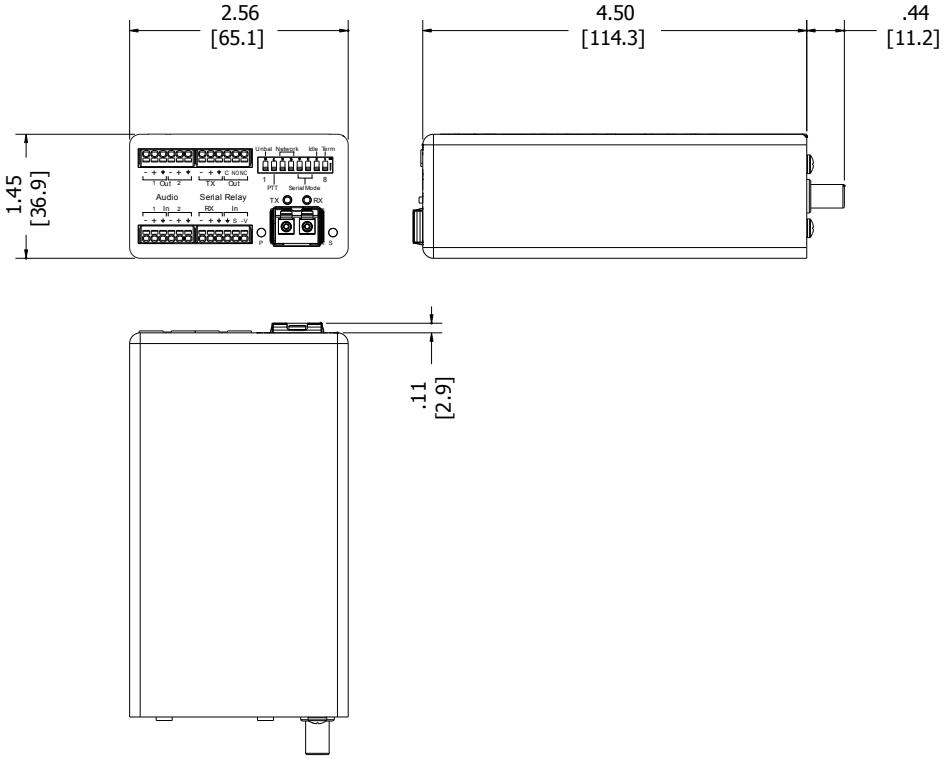


Figure 6 FOI-7280 Dimensions

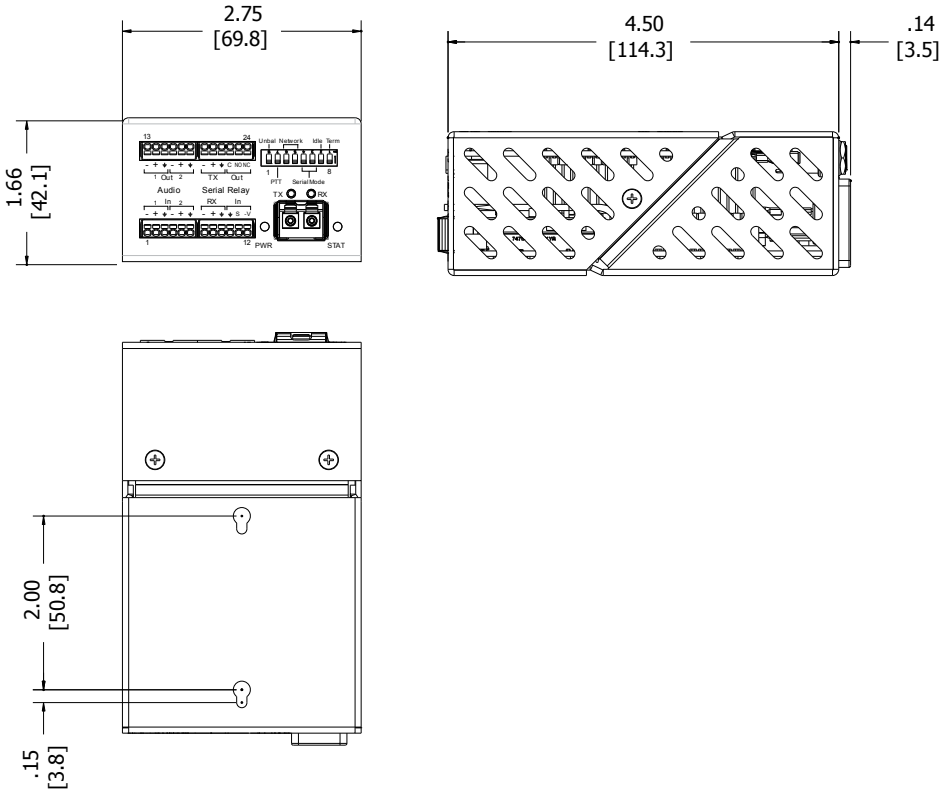


Figure 7 TD-7280 Dimensions

AUDIO SPECIFICATIONS

		Min	Typ	Max	unit
DC Response	Linear Range	-7		+7	VDC
	Offset		20		mV
	Gain Error	-3		+3	%
Frequency Response	20 Hz to 25 KHz	-0.5	0	0.5	dB
	26 KHz to 45 KHz	-1.5	0	1.5	dB
Third Harmonic Distortion plus Noise (THD+N)* - 1 KHz @ +4 dBu		-	0.015	-	%
Input Level (with max 1% THD)		-60	0	+17	dBu
			-		VDC
Input Sensitivity		0.020	0.775	7	Vrms
Input Noise Floor ref +0 dBu		-	-80	-	dBu
Input Impedance		-	2	-	KΩ
Output Level		0.02	0.775	7	Vrms
Output Impedance		-	150	-	Ω
Output for Use with Nominal		-	600	-	Ω
Audio Latency (point to point)		-	1260	-	µs
Sampling Rate		24 bit / 96kHz or 24 bit / 48 kHz			

*Hum & Noise are measured with an AES17 compliant filter at 20 kHz. Temperature condition @+10 - +25° C.

SERIAL DATA SPECIFICATIONS

		Min	Typ	Max	unit
RS-422 / RS-485	Output Levels into 100Ω Load	-	±2	-	VDC
	Input Levels	-7	-	+7	VDC
	Input Threshold	±0.2	-	-	VDC
	Data Rate	0	-	1	Mbps
	Input Termination	-	150	-	KΩ
RS-232	Output Levels, 3KΩ Termination	±5	±5.4	-	VDC
	Input Levels	-15	-	+15	VDC
	Input Threshold	±3	-	-	VDC
	Data Rate	0	-	1	Mbps
	Input Termination	3	-	2.3	K Ω

CONTROL/RELAY SPECIFICATIONS

		Min	Typ	Max	unit
Shorting Actuation	Voltage Threshold	-	0	2.5	VDC
	Load	-	0	1	KΩ
Negative Voltage Actuation	Voltage Threshold	-48	-	-6	VDC
	Load	2	-	25	mA
Relay Output	On Resistance	-	10	15	Ω
	Off Resistance NO contacts	0.35	-	5000	GΩ
	Off Resistance NC Contacts	0.1	-	1.4	GΩ
	Voltage Limit	0	-	200	VDC
	Current Limit	0	-	200	mA

ELECTRICAL SPECIFICATIONS

		Min	Typ	Max	unit
Environmental	Storage Temperature (°C)	-40	-	85	°C
	Operating Temperature (°C)	0	-	50	°C
Power Requirement	Voltage Range	7	9	24	VDC
	Supply Current, no SFPs	-	600	-	mA
Phoenix™ Mating Plug 6 pos Audio/Serial/Control (PN 1778874)	Wire Accepted	20	-	26	AWG
	Nominal Voltage	-	-	160	V
	Nominal Current	-	-	6	A
Phoenix™ Mating Plug 3 pos Power (TD Only) (PN 1827716)	Wire Accepted	14	-	28	AWG
	Nominal Voltage	-	-	300	V
	Nominal Current	-	-	8	A
Power Adapter Connection	FOI-7280	LEMO™			
	TD-7280	Standard 5.5 x 2.1 mm DC barrel, center positive			

OPTICAL SPECIFICATIONS

External SFP Interface	Min	Typ	Max	unit
Data Rate	-	346	-	Mbps
Recommended Jitter	-	40	-	Psec
Operating Voltage	-	3.3		VDC
Maximum Current	-	-	500	mA
Optical Modules	SFP MSA (SFF-8431, SFF-8432, SFF-8433) compliant slot, data rate 266 – 1.25 Gbps			

PHYSICAL SPECIFICATIONS

Case Dimensions	Length	Width	Height	Weight
FOI-7280 (Size 4)	4.5 in (114 mm)	1.453 in (37 mm)	2.56 in (65 mm)	2 lb (0.9 kg)
TD-7280	4.5 in (114 mm)	2.75 in (70 mm)	1.66 in (42 mm)	0.4 lb (0.2 kg)

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